What Works Clearinghouse

ies INSTITUTE OF EDUCATION SCIENCES

I CAN Learn® Pre-Algebra and Algebra

Program description

The *I CAN Learn® Pre-Algebra* and *Algebra* computerized curricula are designed to cover mathematics and problem-solving skills for ethnically diverse, inner-city students in grades 6–12. The curricula are designed to equip students with the skills they need to meet district, state, and national math objectives through an interactive software program that teaches pre-algebra and algebra. The *I CAN Learn® Pre-Algebra* software program consists of 131 lessons, and *Algebra* of 181 lessons. The developer describes the curriculum software as meeting National Council of Teachers of Mathematics standards and configurable to meet state and local grade-level expectations.

Research

One study of *I CAN Learn® Pre-Algebra* and *Algebra* met the What Works Clearinghouse (WWC) evidence standards and five more studies met WWC evidence standards with reservations. The six studies, which included more than 16,600 eighth- and ninth-grade students in middle and high schools in California, Florida, Georgia, and Louisiana, compared the standardized math performance of students who used the *I CAN Learn®* system with that of students who used traditional curricula.[1]

Effectiveness

The *I CAN Learn® Pre-Algebra* and *Algebra* curricula were found to have positive effects on math achievement.

	Math achievement
Rating of effectiveness	Positive effects
Improvement index[2]	Average: +6 percentile points Range: –7 to +20 percentile points

1. The evidence presented in this report is based on the available research. Findings and conclusions may change as new research becomes available.
2. These numbers show the average and range of improvement indices for all findings across the studies.

Additional program information

Updating previous report

This report updates the previous WWC report on *I CAN Learn*® that was released on the WWC website in November 2004. Since the release of the previous report, the WWC has updated its evidence standards and developed peer-review procedures for adjusting such methodological flaws in studies as mismatch between the unit of assignment and the unit of analysis and lack of adjustment for multiple comparisons. These standards and procedures, when applicable, have been applied to studies included the original *I CAN Learn*® *Pre-Algebra* and *Algebra* review. Six new studies were identified for this updated report.

Developer and contact

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Scope of use

The curriculum was first implemented in 1995. As of March 2006, the *I CAN Learn*® system was being used in 16 elementary schools, 101 middle schools, and 123 junior and senior high schools across the United States. The *I CAN Learn*® system is typically used in large urban school districts and smaller rural school districts where students are predominantly at-risk and members of ethnic minority groups.

Teaching

The pre-algebra and algebra lessons include instructional videos, interactive multimedia presentations, and a question bank. Both curricula were designed to connect math topics to "real world" applications. Lessons are grouped much like those in a textbook chapter. Students receive verbal and visual assistance in progressing through the lesson. After completing a lesson, students complete a cumulative review of the concepts taught, and teachers can monitor student progress through real-time assessment.

Although much of the instruction is individualized for students in the *I CAN Learn*® system, teachers are expected to help determine the content of the lesson and other aspects of the class. At the beginning of the year the teacher determines the homework assignments, lesson organization, lesson presentation, manipulatives, assessments, and grade evaluations. The program follows the teacher's lesson plan and provides constant feedback to both the student and the teacher. According to the developer, teachers can accommodate different learning styles in a classroom of up to 30 students using the *I CAN Learn*® system. The *I CAN Learn*® system also aims to facilitate classroom management, since teachers can use the Classroom Explorer tool to record attendance, homework, and test grades and to chart individual student progress.

As part of the *I CAN Learn*® system, teachers receive an initial two-day training in how to use the system. Teachers also have "best practices" training and unlimited access to training and on-site technical and pedagogical support in the classroom for three years. *I CAN Learn*® system personnel call or visit *I CAN Learn*® teachers weekly.

Cost

The cost of an *I CAN Learn*® classroom depends on its configuration and terms of support. A typical full installation—30 workstations in a classroom with all curriculum and classroom management software, computer hardware, network wiring, furniture, and three years of comprehensive onsite educational and technical support—costs $300,000, a one-time expense.

Research

In this updated review, 12 studies reviewed by the WWC investigated the effects of *I CAN Learn*® on students' math achievement. One study (Kirby, 2006 October) was a randomized controlled trial that met WWC evidence standards. Two studies (Kerstyn, 2001; Kerstyn, 2002 October) used a quasi-experimental design that met WWC standards with reservations. Three studies (Kirby 2004 September; Kirby, 2004a November; Kirby, 2005 January) were randomized controlled trials that met WWC

evidence standards with reservations because of teacher-intervention confounding problems. The remaining six studies did not meet WWC evidence screens.[3] Although each study investigated the effect of *I CAN Learn*® on a narrow population and setting, collectively the studies investigated and reported on middle school students of diverse racial and economic backgrounds in urban, suburban, and rural districts.

Met evidence standards

Kirby (2006, October) assessed the impact of the *I CAN Learn*® system on 2003–04 math achievement by randomly assigning students to intervention or comparison classrooms. The study included 2,400 eighth-grade regular education students from 13 Orleans Parish Public Schools. *I CAN Learn*® classrooms were compared with classrooms using a traditional curriculum.

Met evidence standards with reservations

Kerstyn (2001) used a classroom matched-pairs quasi-experimental design to investigate the effect of the first year of implementation of the *I CAN Learn*® system on math achievement of eighth-grade students in Hillsborough County Public Schools in Tampa, Florida. At the beginning of the 2000–01 school year, 58 *I CAN Learn*® classrooms (with 1,222 students) were matched with 58 traditional mathematics classrooms (with 1,314 students). The *I CAN Learn*® system was implemented with four separate samples of students enrolled in four math courses: Algebra 1 (8 classes, 175 students), Algebra 1 Honors (8 classes, 150 students), MJ-3 pre-algebra (32 classes, 678 students), and MJ-3 Advanced (10 classes, 219 students). The effectiveness of the *I CAN Learn*® system is reported for each of the four study samples in the Findings section.

Kerstyn (2002, October) continued the investigation of the *I CAN Learn*® system during the second year of implementation in Hillsboro County Public Schools with a quasi-experimental study of a different sample of 11,125 eighth-grade students in a total of 597 classrooms. The *I CAN Learn*® system was implemented with four separate samples of students enrolled in four math courses: Algebra 1 (10 classes, 188 students), Algebra 1 Honors (10 classes, 188 students), MJ-3 pre-algebra (64 classes, 1,028 students), and MJ-3 Advanced (37 classes, 424 students). The effectiveness of the *I CAN Learn*® system is reported for each of the four study samples in the Findings section.

Kirby (2004, September) assessed the impact of the *I CAN Learn*® system on 2003–04 math achievement by randomly assigning 204 eighth-grade students either to one teacher using the *I CAN Learn*® mathematics curriculum or two teachers using a traditional math curriculum in Bret Harte Middle School in Alameda County, California. The comparison classrooms used the state-adopted Glencoe pre-algebra textbook. Because there was only one *I CAN Learn*® teacher, it is not possible to separate the effect of the teacher from the effect of the *I CAN Learn*® system. Thus, even though students were randomly assigned, this study met WWC standards with reservations.

Kirby (2004a, November) randomly assigned 254 students either to *I CAN Learn*® classes or comparison classes. In the *I CAN Learn*® classes, one teacher facilitated instruction using the computerized curriculum. Students in the comparison classroom used a traditional math curriculum delivered by their teachers. Because there was only one *I CAN Learn*® teacher, it is not possible to separate the effect of the teacher from the effect of the *I CAN Learn*® system. Thus, even though students were randomly assigned, this study met WWC standards with reservations.

3. One study, Kirby (2004b, November), failed to meet evidence screens in the original review because of missing data for effect-size computations, but was reclassified as meets WWC standards in this updated report based on updated information (Kirby, 2006 October). A second study, Kirby (2004a, November), met WWC standards in the original review but met WWC standards with reservations in this updated review because only one teacher delivered the instruction using the *I CAN Learn*® system, and the WWC had reservations about the confounding of teacher characteristics with the intervention. A third study (Kirby, 2005 January) that met evidence standards with reservations was a new study added to this report.

Research *(continued)*

Kirby (2005, January) randomly assigned 137 ninth-grade students either to *I CAN Learn*® classrooms or traditional mathematics classrooms in a high school in Catoosa County, Georgia, in 2004. Because there was only one *I CAN Learn*® teacher, it is not possible to separate the effect of the teacher from the effect of the *I CAN Learn*® system. Thus, even though students were randomly assigned, this study met WWC standards with reservations.

Effectiveness

Findings

The WWC review of middle school math addresses student outcomes in the math achievement domain.

Kirby (2006, October) reported that the *I CAN Learn*® group statistically significantly outperformed the comparison group on the math exam from the Louisiana Educational Assessment Program test. The WWC confirmed this finding after correcting the statistical significance level for clustering.

Kerstyn (2001) reported positive but not statistically significant effects of *I CAN Learn*® classrooms over comparison classrooms for Algebra 1, Algebra 1 Honors, MJ-3 pre-algebra, and MJ-3 Advanced courses. The effect size for each of these samples was not large enough to be considered substantively important according to WWC criteria (at least 0.25).

Kerstyn (2002, October) reported, and the WWC analysis confirmed, a positive and statistically significant effect for *I CAN Learn*® students in MJ-3 pre-algebra classes. The author also reported negative effects for students in the Algebra 1, Algebra 1 Honors, and MJ-3 Advanced courses. But the WWC concluded that these negative effects were neither statistically significant nor large enough to be considered substantively important by WWC criteria. Thus, *I CAN Learn*® showed a statistically significant positive effect for MJ-3 pre-algebra students and indeterminate effects for Algebra 1, Algebra 1 Honors, and MJ-3 Advanced students.[4]

Kirby (2004, September) reported that the *I CAN Learn*® group statistically significantly outperformed the comparison group on the General Mathematics exam from the California Standards Test. The statistical significance of this effect was confirmed by WWC analysis.

Kirby (2004a, November) reported that the *I CAN Learn*® group statistically significantly outperformed the comparison group on the Math exam from the Georgia Criterion-Referenced Competency Test. The statistical significance of this effect was confirmed by WWC analysis.

Kirby (2005, January) reported that a higher percentage of *I CAN Learn*® students than comparison students passed the Algebra 1 End-of-Course Test in Georgia. The statistical significance of this effect was confirmed by WWC analysis.

In sum, in the math achievement domain, the WWC reviewed findings from 12 samples reported in six studies.[5] Five of these samples showed statistically significant positive effects, and the remaining seven samples showed indeterminate effects. One of the samples was examined in a study that used a strong design.

Rating of effectiveness

The WWC rates the effects of an intervention in a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative. The rating of effectiveness takes into account four factors: the quality of the research design, the statistical significance of the findings,[6] the size of the difference between participants in the intervention and comparison conditions, and the consistency in findings across studies (see the WWC Intervention Rating Scheme).

4. Findings for subgroups, such as MJ-3 pre-algebra students who were not Florida Comprehensive Assessment Test (FCAT) exempt and MJ-3 pre-algebra students exempt from the FCAT, are reported in Appendix A4, but are not included in the WWC rating of effectiveness for the intervention.
5. The four courses in the Kerstyn (2001; 2002 October) studies—Algebra 1, Algebra 1 Honors, MJ-3 pre-algebra, and MJ-3 Advanced—were treated as separate studies because they examined effects of *I CAN Learn*® on different samples of students using different curricula.

The WWC found *I CAN Learn*® *Pre-Algebra* and *Algebra* to have positive effects on math achievement

Improvement index

The WWC computes an improvement index for each individual finding. In addition, within each outcome domain, the WWC computes an average improvement index for each study and an average improvement index across studies (see Technical Details of WWC-Conducted Computations). This improvement index represents the difference between the percentile rank of the average student in the intervention condition versus the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is entirely based on the size of the effect, regardless of the statistical significance of the effect, the study design, or the analyses. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.

The average improvement index for math achievement is +6 percentile points across the six studies, with a range of –7 to +20 percentile points across findings.

Summary

The WWC reviewed 12 research reports on the *I CAN Learn*® *Pre-Algebra* and *Algebra* curricula for this updated curriculum report. Of these, one study met WWC standards and five studies (which reported on 11 student samples or sub-studies) met WWC standards with reservations. The remaining six studies did not meet WWC evidence screens. Based on the findings reported in these studies, the WWC concluded that the *I CAN Learn*® system has a positive effect on math achievement. The evidence presented in this report may change as new research emerges.

References

Met WWC evidence standards

Kirby, P. C. (2006, October). *I CAN Learn® in Orleans Parish Public Schools effects on LEAP 8th grade math achievement, 2003–2004.* (Available from ed-cet, Inc., 2301 Killdeer Street, New Orleans, LA 70122)

Additional source:

Kirby, P. C. (2004b, November). *I CAN Learn® in Orleans Parish Public Schools effects on LEAP 8th grade math achievement, 2003–2004.* (Available from ed-cet, Inc., 2301 Killdeer Street, New Orleans, LA 70122)

Met WWC evidence standards with reservations

Kerstyn, C. (2001). *Evaluation of the I CAN Learn® mathematics classroom: First year of implementation (2000–2001 school year).* (Available from the Division of Instruction, Hillsborough County Public Schools, 901 East Kennedy Blvd., Tampa, FL 33602)

Kerstyn, C. (2002, October). *Evaluation of the I CAN Learn® mathematics classroom: Second year of implementation (2001–2002 school year).* (Available from the Division of Instruction, Hillsborough County Public Schools, 901 East Kennedy Blvd., Tampa, FL 33602)

Kirby, P. C. (2004, September). *Comparison of I CAN Learn® and traditionally-taught 8th grade general math student performance on the California Standards Test, Spring 2004.* (Available from ed-cet, Inc., 2301 Killdeer Street, New Orleans, LA 70122)

Kirby, P. C. (2004a, November). *Comparison of I CAN Learn® and traditionally-taught 8th grade student performance on the Georgia Criterion-Referenced Competency Test.* Unpublished manuscript.

Kirby, P. C. (2005, January). *I CAN Learn® Algebra I in Catoosa County, Georgia.* (Available from ed-cet, Inc., 2301 Killdeer Street, New Orleans, LA 70122)

6. The level of statistical significance was reported by the study authors or, where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation, see the WWC Tutorial on Mismatch. See Technical Details of WWC-Conducted Computations for the formulas the WWC used to calculate the statistical significance. In the case of *I CAN Learn® Pre-Algebra and Algebra,* corrections for clustering were needed.

References *(continued)*

Did not meet WWC evidence screens

Brooks, C. (1999, August). *Evaluation of Jefferson Parish technology grant: I Can Learn® Algebra I.* Unpublished report submitted to the Superintendent of Jefferson Parish Public Schools.[7]

Brooks, C. (2000, September). *Evaluation of Jefferson Parish technology grant: I CAN Learn® Algebra I.* (Available from the Department of Educational Leadership, University of New Orleans, New Orleans, LA 70148)[8]

Gill, J. C., & Gifford, C. S. (2001). *Evaluation of Jefferson Parish technology grant: I CAN Learn® Algebra I.* Unpublished manuscript, University of New Orleans, LA.[9]

Oescher, J. (2002, January). *I CAN Learn® education success in California.* (Available from JRL Enterprises, Inc., 3520 General DeGaulle Drive, Suite 1100, New Orleans, LA 70114)[9]

Oescher, J., & Kirby, P. C. (2004, December). *I CAN Learn® results in Dallas, Texas: 9th grade 2003–2004.* (Available from JRL Enterprises, Inc., 3520 General DeGaulle Drive, Suite 1100, New Orleans, LA 70114)[9]

Scafide, K. (2004, November). *Effects of I CAN Learn® on math achievement in Gwinnett County Middle School.* (Available from JRL Enterprises, Inc., 3520 General DeGaulle Drive, Suite 1100, New Orleans, LA 70114)[9]

For more information about specific studies and WWC calculations, please see the WWC *I CAN Learn®* *Pre-Algebra* and *Algebra* Technical Appendices.

7. Complete data were not reported: the WWC could not compute effect sizes.
8. Lack of evidence for baseline equivalence: the study, which used a quasi-experimental design, did not establish that the comparison group was equivalent to the intervention group at baseline.
9. Does not use a strong causal design: there was only one teacher in each study condition for this quasi-experiment, so the analysis could not separate the effects of the intervention from the effects of the teacher.